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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Application Number: 09/518,204

Filing Date: March 03, 2000

Appellant(s): KEUNG HO ET AL.

Stephen B. Ackerman
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed March 08, 2004.

(1) *Real Party in Interest*

A statement identifying the real party in interest is contained in the brief.

(2) *Related Appeals and Interferences*

A statement identifying the related appeals and interferences which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief.

(3) *Status of Claims*

The statement of the status of the claims contained in the brief is correct.

(5) *Summary of Invention*

The summary of invention contained in the brief is deficient because the summary of invention relies on the claims with reference to the specific places in the specification and drawings to support the claimed subject matter. However, in the summary of invention in Brief on page 3 claim 1 is first said to be "(AMENDED)" in line 3, and then is recited as "(previously amended)" in line 5. However, claim 1 has never been amended, therefore, such presentation engenders a confusion and does not provide the real status of the claims.

(6) *Issues*

The appellant's statement of the issues in the brief is correct.

(7) *Grouping of Claims*

Appellant's brief includes a statement that claims 1-18 do not stand or fall together and provides reasons as set forth in 37 CFR 1.192(c)(7) and (c)(8).

(8) ClaimsAppealed

The copy of the appealed claims contained in the Appendix to the brief is correct.

(9) *Prior Art of Record*

5,770,095 Sasaki et al 01-1998

Ng et al. "Synthesis of Some Carbonyl Derivatives of BTA and Determination of Their Inhibitive Properties for Copper in 3% NaCl Solution", Corrosion Science and Protection Technology, Vol. 9 (3), July 1997, 1/201-204.

(10) *Grounds of Rejection*

The following ground(s) of rejection are applicable to the appealed claims:

Claims 1-18 are rejected under 35 U.S.C. 103(a). This rejection is set forth in a prior Office Action, mailed on 05/29/2003 and 04/22/2002.

Sasaki discloses a polishing method comprising of forming a layer made of material containing a metal of copper as a main component over a substrate having recessed portions on a surface thereof so as to fill the recessed portion with the metal layer (Figures 2A and 2B); polishing the metal layer by a chemical mechanical polishing method using a slurry including a polishing agent containing a chemical agent being responsible for forming a protective film on the surface of the metal layer by reacting with the material containing a metal as a main component, wherein the chemical agent includes a **benzotriazole (BTA) or its derivatives** (column 3, lines 37-54, especially line 41, lines 55-58), and emphasizes that **various** BTA derivatives can be used (col.8, lines 24, 25) and an etching agent, which includes H_2O_2 , HF, and amino acid (reads on

oxidizer, acid and organic amine of the instant claims 3, 4, 10, 11, 15, 16) being responsible for etching the material containing a metal as a main component (column 4, lines 1-12, column 8, lines 29-32), wherein the protective chemical agent present in the slurry is 0.001 mole/l (column 6, line 42).

Sasaki differs from the instant claims 1, 8, and 14 by disclosing a **benzotriazole** and its various derivatives, but not specifically recognizing the use of a **carbonyl derivative of benzotriazole**.

However, Ng et al. discloses the use of carbonyl derivatives of benzotriazole for protecting copper on printed circuit boards (translation: abstract, page 2, lines 1-5). The chemical agent for such protection includes seven types carbonyl derivative of benzotriazole (translation: abstract and figure on page 6) for making a protective layer on copper (translation: page 2, lines 21-23). These carbonyl benzotriazole derivatives are identical to those recited in the instant claims 2, 9, and 14.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize the carbonyl derivative of BTA, as taught by Ng in the polishing method of Sasaki, in lieu of VARIOUS DERIVATIVES OF BTA, as suggested by Sasaki, because Ng teaches that a carbonyl derivative of benzotriazole has a higher inhibition rate than BTA in the sense that the carbonyl derivative of benzotriazole produces a chelation reaction with copper ions, creating a protective film with more intensive hydrophobic ability and higher resistance against penetration (translation: page 9, lines 20-23) and can be used for protection of copper on printed circuit boards (translation: page 2, lines 21-23).

As to claims 5, 6, 12, 13, 17, and 18, the selection of concentration parameters would have been obvious. Normally, it is to be expected that a change in concentration would be an unpatentable modification. Under some circumstances, however, changes such as these may impart patentability to a process if the particular ranges claimed produce a new and unexpected result, which is different in kind and not merely degree from the results of the prior art. Such ranges are termed as critical ranges and the applicant has the burden of proving such criticality. More particularly, where the general conditions of a claim are disclosed in the prior art it is not inventive to discover the optimum or workable ranges by routine experimentation. *In re Aller* 105 USPQ 233, 255 (CCPA 1955). See also *In re Waite* 77 USPQ 586 (CCPA 1948), *In re Scherl* 70 USPQ 204 (CCPA 1946), *In re Irmscher* 66 USPQ 314 (CCPA 1945), *In re Norman* 66USPQ 308 (CCPA 1945), *In re Swenson* 56 USPQ 372 (CCPA 1942), *In re Sola* 25 USPQ 433 (CCPA 1935), *In re Dreyfus* 24 USPQ 52 (CCPA 1934). And as we have here, Sasaki teaches a method, wherein the chemical agent responsible for forming a protective film on the surface of the copper is present at a concentration of 0.001 mole/l (column 6, line 42) or a ratio of 1/1000 to 3/100 (column 14, lines 22-25). Concentration limitations are obvious absent a showing of criticality. *Akzo v. E.I. du Pont de Nemours* 1 USPQ 2d 1704 (Fed. Cir. 1987).

(11) Response to Argument

Appellants arguments in Brief filed March 8, 2004 were fully considered, but they are not persuasive.

The crux of Appellants arguments is that Sasaki Patent describes a CMP metal polishing method using a slurry including a polishing agent containing: a chemical agent including "benzotriazole . . . (BTA), BTA derivatives including tryltriazole (TTA) which is prepared by substituting a hydrogen atom of a benzene ring of BTA with a methyl group, . . . that forms a protective film on the surface of the metal layer; and an etching agent of H_2O_2 , HF and an amino acid for etching the metal layer. Sasaki, Col. 3, lines 38 to 44." Applicants further elaborate that the Sasaki Patent "limits" BTA derivatives. With all due respect to Appellants' opinion, this is not found persuasive, and Appellants' attention is respectfully drawn to the disclosure of Sasaki, col. 8, lines 25, 26 that teaches VARIOUS derivatives of BTA.

Appellants argues that Sasaki does not disclose the use of a carbonyl derivative of BTA. In response to this, it is noted that had Sasaki disclosed the use of a specific carbonyl derivative of BTA, the rejection would have been under 35 USC 102 not 103. However, Sasaki expressly teaches to those skilled in the art the use of VARIOUS derivatives of BTA.

Appellants further state that Ng article describes the synthesis of seven (7) types of carbonyl derivatives of BTA. In the Examiner's opinion this is not a precise and complete analysis of Ng's article. What is most important is that Ng teaches the use of these carbonyl BTA derivatives (identical to those instantly claimed) for protecting

copper on printed circuit boards (translation: abstract, page 2, lines 1-5). The chemical agent for such protection includes seven types of carbonyl derivatives of benzotriazole (translation: abstract and figure on page 6) for making a protective layer on copper (translation: page 2, lines 21-23).

Appellants' statement that "the Examiner has not presented a convincing line of reasoning as to why the claimed subject matter as a whole, including its differences over the prior art, would have been obvious; the prior art references do not contain any suggestions (express or implied) that they be combined, or that they be combined in the manner suggested; and each reference is complete and functional in itself, so there would be no reason to use parts from or add or substitute parts to any reference" is absolutely not persuasive.

In response to appellants' argument that there is no suggestion to combine the references, suggestion, or motivation to do so comes from either the references themselves or from the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988)=d *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992).

In the instant case, Sasaki teaches that VARIOUS BTA derivative are used. Ng et al. teaches that a carbonyl derivative of benzotriazole creates a more enhanced protective film with more intensive hydrophobic ability and higher resistance against penetration and can be used for protection of copper on printed circuit boards. Additionally, both references are in the same field of endeavour, directed to the formation of a protective film for copper using derivatives of benzotriazoles.

Resuming the above, in the instant case the motivation to combine references comes from “three sources: the nature of the problem to be solved, the teaching of both prior art and the knowledge of persons of ordinary skill in the art”, as per *In re Rouffet*, 149 F3d 1350, 1357, 47 USPQ2d 1453, 1457-58 (Fed. Cir. 1998)

It is further noted that Appellants argument relies on a preferred embodiment of Sasaki with a derivative prepared by substituting a hydrogen. Appellants’ arguments are unpersuasive because Appellants are relying on preferred embodiments instead of the teaching as a whole. The broad disclosure of a reference in relevant prior art for all it would have suggested to those of ordinary skill. A reference may be relied upon for all that it would have reasonably suggested to one having ordinary skill in the art, including non-preferred embodiments. Disclosed examples and preferred embodiments do not constitute a teaching away from a broader disclosure. *In re Susi*, 440 F.2d 442, 169 USPQ 423 (CCPA 1971). “. A reference may be relied upon for all that it would have reasonably suggested to one having ordinary skill the art, including non-preferred embodiments.” *Merck & Co. v. Biocraft Laboratories*, 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied, 493 U.S. 975 (1989). See also *Celeritas Technologies Ltd. v. Rockwell International Corp.*, 150 F.3d 1354, 1361, 47 USPQ2d 1516, 1522-23 (Fed. Cir. 1998).

Appellants argue that “Claims do not stand or fall together”, and that all claims are separately patentable.

Items (a) through (g) on pages 10, 11 of Brief are separately addressed below:

(a) *"the claim 2 limitation of wherein the carbonyl derivative of benzotriazole has the formula shown is a non-obvious limitation not shown or taught by Sasaki nor Ng in combination with the limitations of independent claim 1"*

Response: The carbonyl derivatives of benzotriazole taught by Ng in Fig on page 6 are identical to those presented in the instant claim 2. The motivation to utilize carbonyl derivatives of BTA as per Ng in lieu of various derivatives in the similar process of Sasaki is fully addressed above.

b)" the claims 3, 10 and 15 limitation of wherein the etching agent includes an oxidizer; an acid or base; and a buffering agent or organic amine is a non-obvious limitation not shown or taught by Sasaki nor Ng in combination with the limitations of respective independent claims 1, 8 and 14;

Response: The specific limitations of claims 3, 10 and 15 are taught by Sasaki, wherein etching agent includes H_2O_2 , HF, and amino acid (reads on oxidizer, acid and organic amine of the instant claims 3, 4, 10, 11, 15, 16) being responsible for etching the material containing a metal as a main component (column 4, lines 1-12, column 8, lines 29-32).

c) "the claims 4, 11 and 16 limitation of wherein the etching agent includes an oxidizer selected from the group consisting of H_2O_2 , KIO_3 , and Fe^{3+} ; an acid or base of HF or $(CH_3)N(OH)$; and a buffering agent or organic amine selected from the group consisting of $NH_4(CH_3CO_2)$, alkanol amine, and amino acid is a non-obvious limitation not shown or taught

by Sasaki nor Ng in combination with the limitations of respective independent claims 1, 8 and 14"

Response: See response to item (b).

d) *"the claims 5, 12 and 17 limitation of wherein the carbonyl derivative of benzotriazole comprises from about 0.0001 to 10 weight % of said polishing agent is a non-obvious limitation not shown or taught by Sasaki nor Ng in combination with the limitations of respective independent claims 1, 8 and 14; Applicants urge that this added limitation is not subject to determination by routine experimentation."*

Response: Appellants' mere speculation that the adjustment of a concentration is not a subject to a routine experimentation is not persuasive, since Appellants have not shown the criticality of a very broad range of claimed concentrations. Furthermore, conventional calculations made on the concentration of BTA in the total of polishing and etching agents as provided in Sasaki in col.6, lines 37-45 result in the concentration of BTA within the claimed range.

e) *"the claims 6, 13 and 18 limitation of wherein the carbonyl derivative of benzotriazole comprises from about 0.01 to 5.00 weight% of said slurry is a non-obvious limitation not shown or taught by Sasaki nor Ng in combination with the limitations of respective independent claims 1, 8 and 14; Applicants urge that this added limitation is not subject to determination by routine experimentation".*

Response: See response to the item (d).

f) *"the claim 7 limitation of wherein the metal is selected from the group*

consisting of Cu, a Cu alloy, Al, and an Al alloy is a non obvious limitation in combination with the limitations of independent claim 1"

Response: The entire patent to Sasaki teaches the polishing method of COPPER, copper alloys, Al and aluminum alloys (see, for example, col. 3, lines 33-35, lines 60, 61, col.5, lines 1-10, 35-40, col. 6, lines 25-30, etc.)

g) *"the claim 9 limitation of wherein the carbonyl derivative of benzotriazole has the formula shown where R is selected from the group consisting of - CH3 (methyl), - CH2CH3 (ethyl), - CH2CH2CH3 (propyl), - CH2CH2CH2CH3 (n-butyl), - C(CH3)3 (tert-butyl), p-tolyl, 1 - Benzotriazolyl - 1 - butamido, 2 - pyridyl, 3 - pyridyl, 4 - pyridyl, 2 - thiophenyl, and 3 - thiophenyl is a non-obvious limitation not shown or taught by Sasaki nor Ng in combination with the limitations of independent claim 8"*

Response: The formulas presented in Ng, page 6 are specific species of carbonyl derivatives, exemplified by a Markush group of the instant claim 9. The motivation to combine Sasaki and Ng to reject claim 8 is addressed above.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

Michael Kornakov
Primary Examiner
Art Unit 1746

M. Kornakov

June 24, 2004

Conferees

Randy Gulakowski

Roy King

GEORGE O. SAILE & ASSOCIATES
28 DAVIS AVENUE
POUGHKEEPSIE, NY 12603

APPEAL CONFeree:

ROY KING
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700

Randy Gulakowski
RANDY GULAKOWSKI
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700